Most settop terminals are tunable. A block diagram for a prior art settop terminal is shown in **Figure 1**. Incoming signals from a CATV transmission network are coupled to an input bandpass amplifier and up-converted to a high intermediate frequency (HI-IF). The up-conversion requires a tunable local oscillator which selects a desired channel and an associated mixer. The mixer is coupled to a bandpass filter and down-converted to an IF channel using a fixed-frequency local oscillator and mixer. The output channel is filtered and forwarded to a subscriber's television receiver. Prior art settop terminals use one down-converter mixer with an oscillator having slight frequency agility to provide an output at one or two preselected channel frequencies. The output frequencies and bandwidths depend upon the transmission standard used.

In the United States, the NTSC (National Television System Committee) is the standard for color television. Other countries have chosen different systems. SECAM (*sequentiel couleur avec mémoire*) is used by France and Russia. PAL A and PAL B (phase alternation line) are used by many European countries such as Germany and the United Kingdom. Accordingly, television receivers are typically manufactured for a specific transmission standard. For worldwide use, a settop terminal must be adapted to the established broadcast standards.

U.S. Patent No. 5,640,697 teaches the use of two predetermined frequencies for each local oscillator, whereby the second oscillator frequency can be adjusted independently of the first oscillator frequency. Adjustment between the two

frequencies is used to adapt to the different output frequencies, while eliminating noise caused by the local oscillators. Similar to U.S. Patent No. 5,640,497, German Patent No. Application 4,306,578 adjusts the oscillator frequencies by a predetermined amount in order to eliminate noise. PCT International Patent Application No. 84/04637 employs two local oscillators that generate predetermined frequencies, in which the second oscillator is selected between one of two frequencies to eliminate this noise.

Accordingly, there exists a need for an inexpensive method to adapt the output of a settop terminal to a variety of television broadcast standards.

WE CLAIM:

1. A communication module which receives an input RF signal and converts said input RF signal to a desired RF output signal (105), the communication module comprising:

a first frequency agile local oscillator (49) for generating a first frequency for mixing with said input RF signal to generate a high intermediate frequency (HI-IF) signal;

a second frequency agile local oscillator (51) for generating a second frequency for mixing with said HI-IF signal to generate said desired RF output signal (105);

a processor [controller] including:

a controller [means] for controlling said first and second frequency agile local oscillators (49, 51) to obtain said desired RF output signal (105); and

a comparator [means] for comparing said first frequency with said second frequency to determine whether any interfering oscillator difference beat frequencies (ODBFs) exist within the bandwidth of said desired RF output signal (105), and for calculating a delta value to avoid said ODBFs; [and] whereby said processor adjusts

[means for adjusting] said first and second frequency agile local oscillators by said delta value such that said first and second frequencies move said interfering ODBFs outside the bandwidth of said desired RF output signal (105).

2. The communication module of claim 1 wherein the communication module receives a plurality of input RF signals and said communication module further includes a signal selector for

selecting one of said plurality of input RF signals for mixing with said first frequency.

3. The communication module of claim 1 further comprising a transmitter, for wirelessly transmitting said RF output signal (105) to a receiver.

4. The communication module of claim 3, whereby said transmitted signal is transmitted within the UHF or VHF frequency bands.

5. The communication module of claim 1, whereby the communication module is encompassed within a single integrated circuit.

6. The communication module of claim 1, whereby the communication module comprises an RF receiver circuit.

7. The communication module of claim 1, whereby the communication module comprises an RF transmitter circuit.

8. The communication module of claim 1 wherein said selected signal represents an analog signal transmission.

9. The communication module of claim 1 wherein said selected signal represents a digital signal transmission.

10. The communication module of claim 2 wherein said processor [controller] further comprises collateral memory for storing a channel map of channels to predetermined channel carrier frequencies; whereby said processor receives

[means for receiving] a specific channel selection request and [inputting said request to said microprocessor; and

said microprocessor] determines said initial first local oscillator frequency.

11. A universal modulator for receiving a plurality of baseband input signals and outputting a desired RF output signal (105) comprising:

a first PLL frequency synthesizer (41) for generating a first frequency for mixing with a baseband audio signal to relocate said baseband audio signal within a desired bandwidth;

a second PLL frequency synthesizer (49) for generating a second frequency for mixing with a summed signal within the desired bandwidth which includes said relocated baseband audio signal and a baseband video signal to produce a HI-IF signal;

a third PLL frequency synthesizer (51) for generating a third frequency for mixing with said HI-IF signal to produce an RF output signal (105); and

[means for] a processor for selecting said first (41), second (49) and third (51) PLL frequency synthesizers based upon said desired RF output signal (105) [including] whereby said processor:

[means for determining] determines a first PLL frequency for said first synthesizer (41);

[means for determining] determines a second initial PLL frequency for said second synthesizer (49);

[means for comparing] compares said second initial PLL frequency with a third initial PLL frequency for said third synthesizer (51) to determine whether any interfering oscillator difference beat frequencies exist within the bandwidth of said RF output signal (105); and

[means for adjusting] adjusts said second and third initial PLL frequencies to move any interfering ODBFs out of the bandwidth of said RF output signal (105).

12. A method for receiving an input RF signal and [converts] converting said input RF signal to a desired RF output signal (105), the method comprising:

generating a first frequency for mixing with said input RF signal to generate a high intermediate frequency (HI-IF) signal;

generating a second frequency for mixing with said HI-IF signal to generate said desired RF output signal (105);

controlling said first and second frequency agile local oscillators to obtain said desired RF output signal (105);

comparing said first frequency with said second frequency to determine whether any interfering oscillator difference beat frequencies (ODBFs) exist within the bandwidth of said desired RF output signal (105), and for calculating a delta value to avoid said ODBFs; and

adjusting said first and second frequency agile local oscillators by said delta value such that said first and second frequencies move said interfering ODBFs outside the bandwidth of said desired RF output signal.